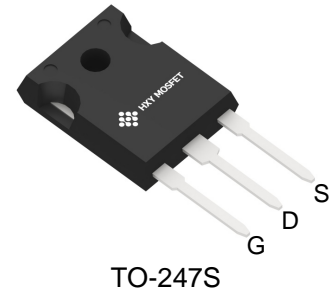




## Description

The IRFP450PBF uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



## General Features

$V_{DS} = 500V$   $I_D = 14A$

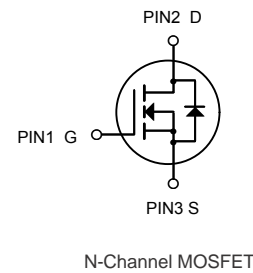
$R_{DS(ON)} < 0.5\Omega @ V_{GS}=10V$

## Application

Battery protection

Load switch

Uninterruptible power supply



## Package Marking and Ordering Information



Product ID	Pack	Brand	Qty(PCS)
IRFP450PBF	TO-247S	HXY MOSFET	30

## Absolute Maximum Ratings $T_c=25^\circ C$ unless otherwise noted

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	500	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_c=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	14	A
$I_D @ T_c=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	8.7	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	56	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	760	mJ
$I_{AS}$	Avalanche Current	8.7	A
$P_D @ T_c=25^\circ C$	Total Power Dissipation <sup>4</sup>	190	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{thJA}$	Maximum Junction-to-Ambient	40	$^\circ C/W$
$R_{thJC}$	Maximum Junction-to-Case (Drain)	0.65	$^\circ C/W$



**Electrical Characteristics (TA=25°C unless otherwise noted)**

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	500	-	-	V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to 25 °C, $I_D = 1\text{ mA}$	-	0.63	-	V/°C
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2.0	-	4.0	V
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20\text{ V}$	-	-	$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 500\text{ V}, V_{GS} = 0\text{ V}$	-	-	25	$\mu\text{A}$
		$V_{DS} = 400\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ °C}$	-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$   $I_D = 8.4\text{ A}^b$	-	0.43	0.5	$\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS} = 50\text{ V}, I_D = 8.4\text{ A}^b$	9.3	-	-	S
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V},$ $V_{DS} = 25\text{ V},$ $f = 1.0\text{ MHz},$ see fig. 5	-	2600	-	$\mu\text{F}$
Output Capacitance	$C_{oss}$		-	720	-	
Reverse Transfer Capacitance	$C_{rss}$		-	340	-	
Total Gate Charge	$Q_g$	$V_{GS} = 10\text{ V}$   $I_D = 14\text{ A}, V_{DS} = 400\text{ V},$ see fig. 6 and 13 <sup>b</sup>	-	-	150	$\text{nC}$
Gate-Source Charge	$Q_{gs}$		-	-	20	
Gate-Drain Charge	$Q_{gd}$		-	-	80	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 250\text{ V}, I_D = 14\text{ A},$ $R_G = 6.2\ \Omega, R_D = 17\ \Omega,$ see fig. 10 <sup>b</sup>	-	17	-	$\text{ns}$
Rise Time	$t_r$		-	47	-	
Turn-Off Delay Time	$t_{d(off)}$		-	92	-	
Fall Time	$t_f$		-	44	-	
Internal Drain Inductance	$L_D$	Between lead, 6 mm (0.25") from package and center of die contact 	-	5.0	-	$\text{nH}$
Internal Source Inductance	$L_S$		-	13	-	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	14	A
Pulsed Diode Forward Current <sup>a</sup>	$I_{SM}$		-	-	56	
Body Diode Voltage	$V_{SD}$	$T_J = 25\text{ °C}, I_S = 14\text{ A}, V_{GS} = 0\text{ V}^b$	-	-	1.4	V
Body Diode Reverse Recovery Time	$t_{rr}$	$T_J = 25\text{ °C}, I_F = 14\text{ A}, di/dt = 100\text{ A}/\mu\text{s}^b$	-	540	810	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	4.8	7.2	$\mu\text{C}$
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S$ and $L_D$ )				

**Notes**

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- b. Pulse width  $\leq 300\ \mu\text{s}$ ; duty cycle  $\leq 2\%$ .



**Typical Characteristics**  $T_a = 25\text{ }^\circ\text{C}$ , unless otherwise noted

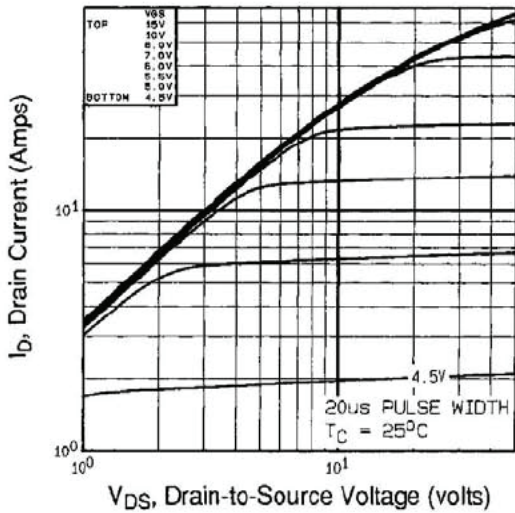


Fig. 1 - Typical Output Characteristics,  $T_c = 25\text{ }^\circ\text{C}$

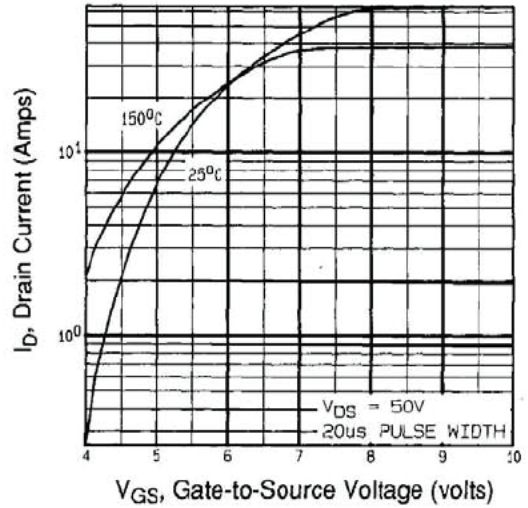


Fig. 3 - Typical Transfer Characteristics

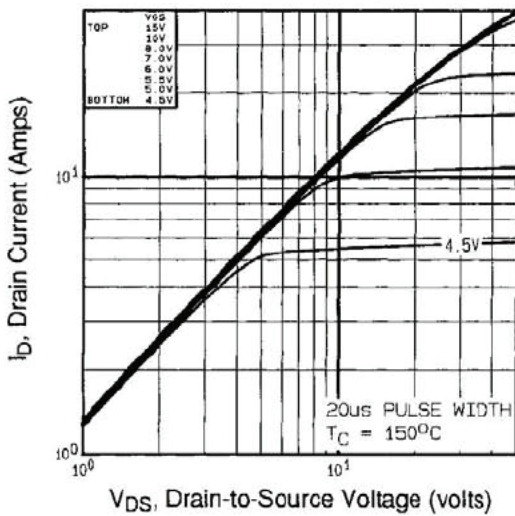


Fig. 2 - Typical Output Characteristics,  $T_c = 150\text{ }^\circ\text{C}$

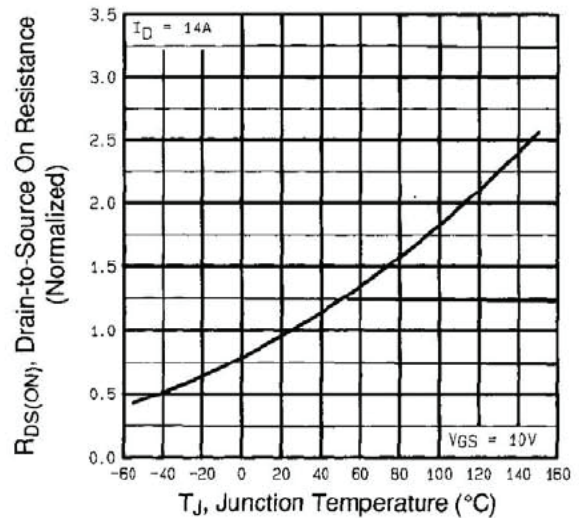


Fig. 4 - Normalized On-Resistance vs. Temperature

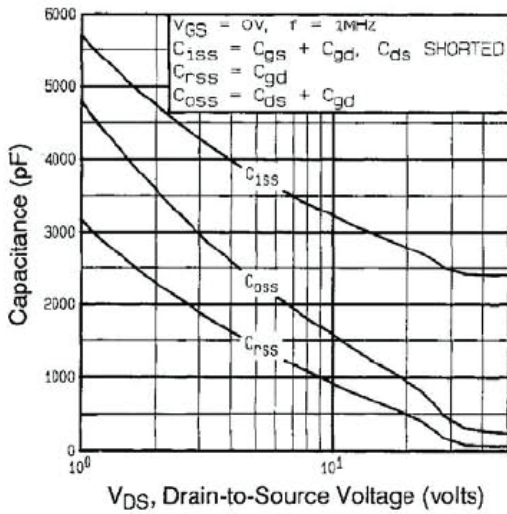


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

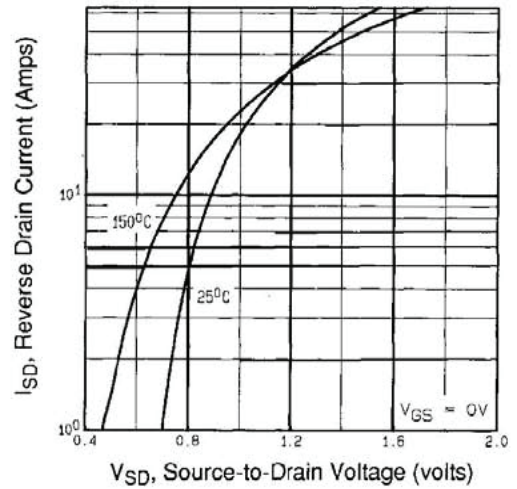


Fig. 7 - Typical Source-Drain Diode Forward Voltage

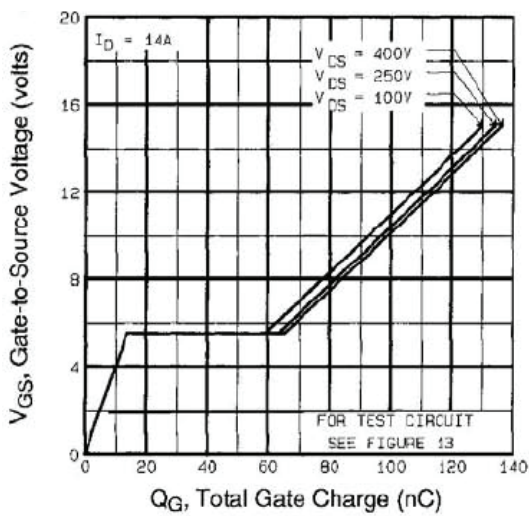


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

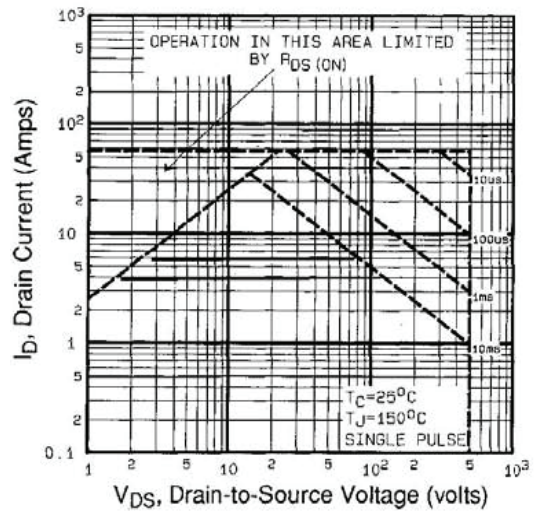


Fig. 8 - Maximum Safe Operating Area

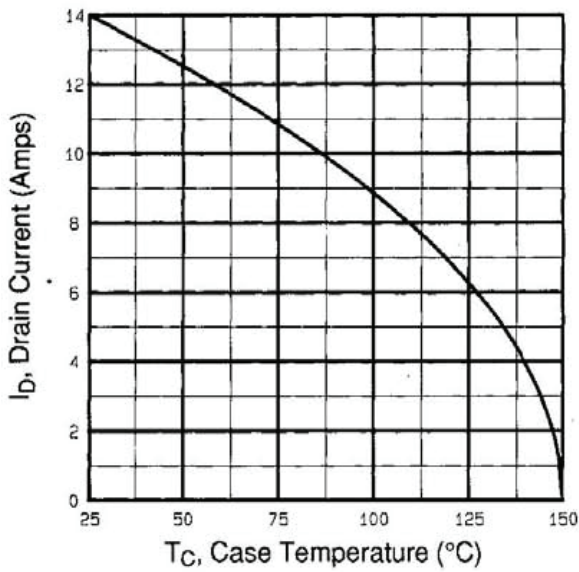


Fig. 9 - Maximum Drain Current vs. Case Temperature

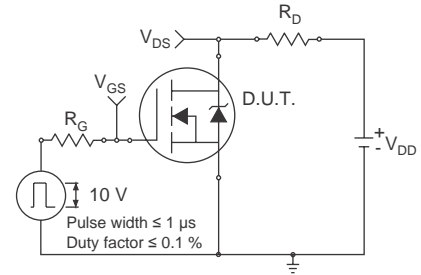


Fig. 10a - Switching Time Test Circuit

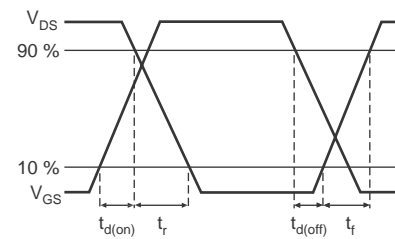


Fig. 10b - Switching Time Waveforms

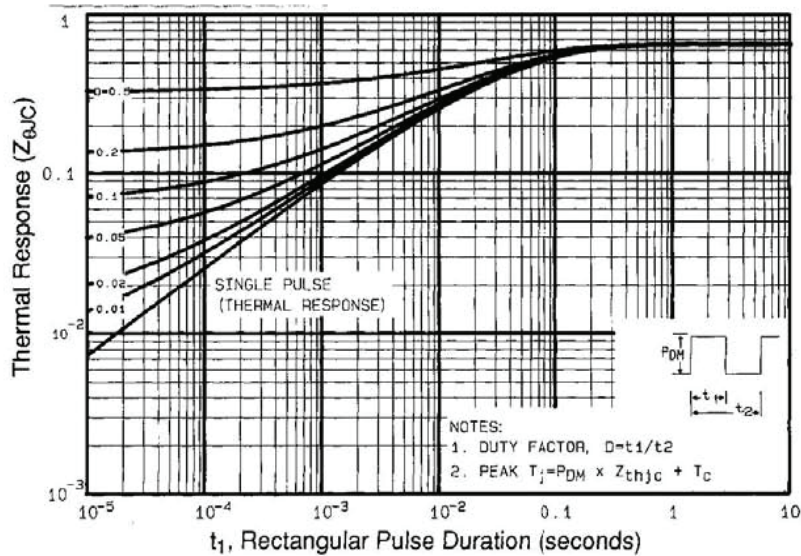


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

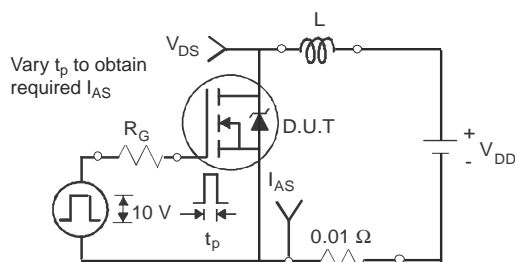


Fig. 12a - Unclamped Inductive Test Circuit

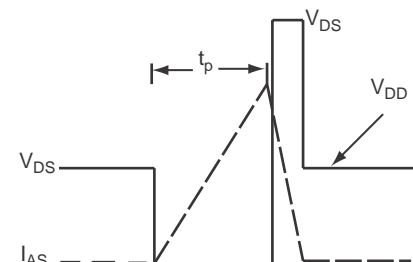


Fig. 12b - Unclamped Inductive Waveforms

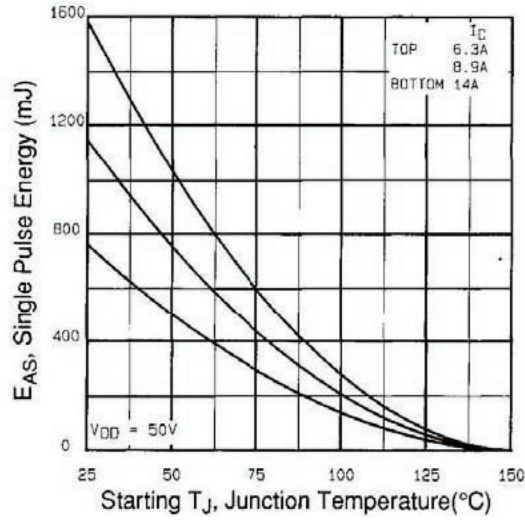


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

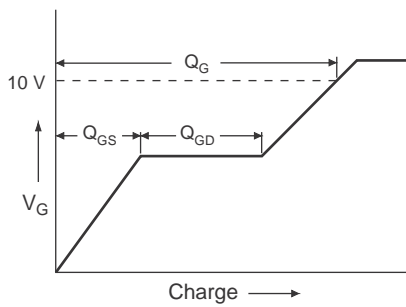


Fig. 13a - Basic Gate Charge Waveform

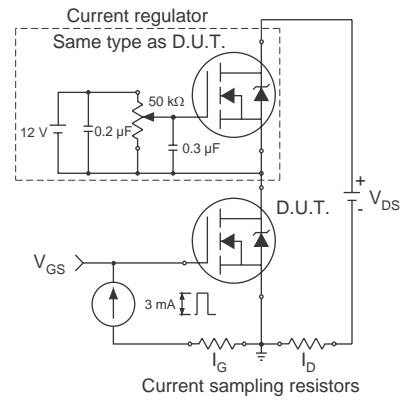
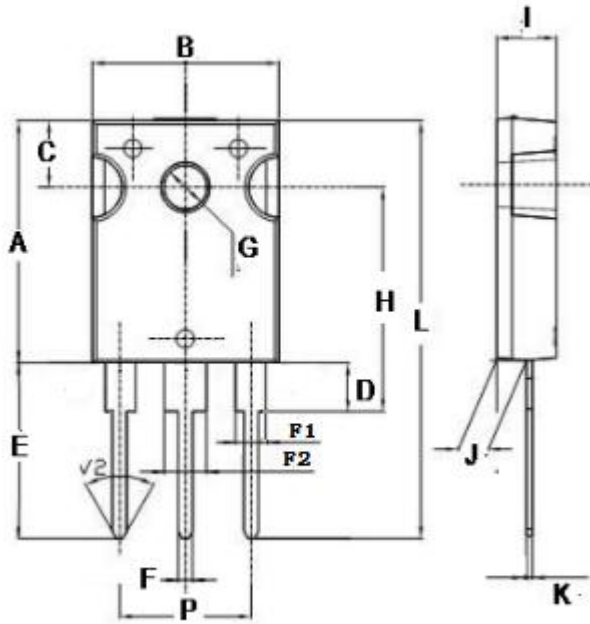


Fig. 13b - Gate Charge Test Circuit



### TO-247S Package Information



Dim	Min	Max
A	20.0	22.0
B	15.5	16.0
C	5.7	6.3
D	4.0	4.4
E	19.0	21.0
F	1.1	1.3
G	3.5	3.8
H	18.3	20.2
I	4.9	5.2
J	2.3	2.5
K	0.55	0.65
L	39.0	42.0
P	10.7	10.9
F1	1.9	2.1
F2	2.9	3.1
mm		



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